Logical and Schematic Organization of Data in BI Tools: A Comparative Analysis between Looker and Power BI

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Abstract

Business Intelligence (BI) tools are essential in modern data analysis, providing powerful mechanisms for transforming raw data into meaningful insights. This article outlines a logical and schematic approach for organizing data in two prominent BI tools—Looker and Power BI—emphasizing structured data sources, dynamic filters, visual clarity, and temporal coherence in data visualization.

Keywords: Business Intelligence, Data Visualization, Looker, Power BI, Filters, Temporal Data, Granularity

1 Introduction

Business Intelligence (BI) refers to the set of technologies, processes, and tools that transform raw data into actionable information to support strategic, tactical, and operational decision-making. The concept traces back to the 1950s, but it gained traction with the emergence of digital computing and data warehousing in the 1990s. Tools like Looker and Power BI are modern exemplars, offering accessible, flexible environments for data modeling and visualization.

2 Structuring Data for BI Tools

Effective BI relies on the integrity of its foundation: the data source. These must be secure, consistently structured, and free of ambiguity or noise. Ambiguity occurs when data points can be interpreted in more than one way, while noise refers to irrelevant or erroneous data that obscures patterns and insights. A rigorous ETL (Extract, Transform, Load) pipeline ensures data fidelity before it reaches the visualization layer.

3 Dynamic Filters: The Rational Engine of Insight

A BI dashboard's core lies not in its charts, but in the filters—the rational levers of interpretative agency. Filters act as the interface between the observer and the phenomenon. As Enlightenment philosopher Immanuel Kant proposed, the mind does not merely absorb reality but actively structures it. Filters are, in this sense, the categorical imperatives of data: they allow the intellect to impose meaning upon the chaotic field of historical records.

The main card of a BI tool must include a clearly demarcated area for filters, which should be visually distinct—usually located at the top or side of the page. This spatial organization echoes

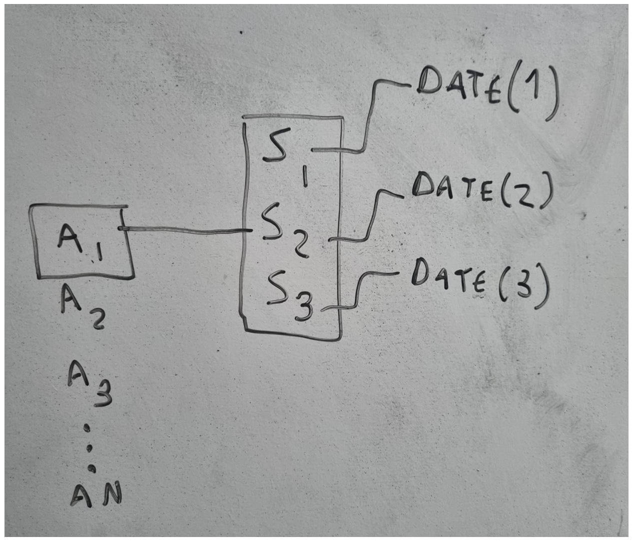

Figure 1: A represents a event, S represents a characteristic or granular information of the event and Date is the time registration of the event.

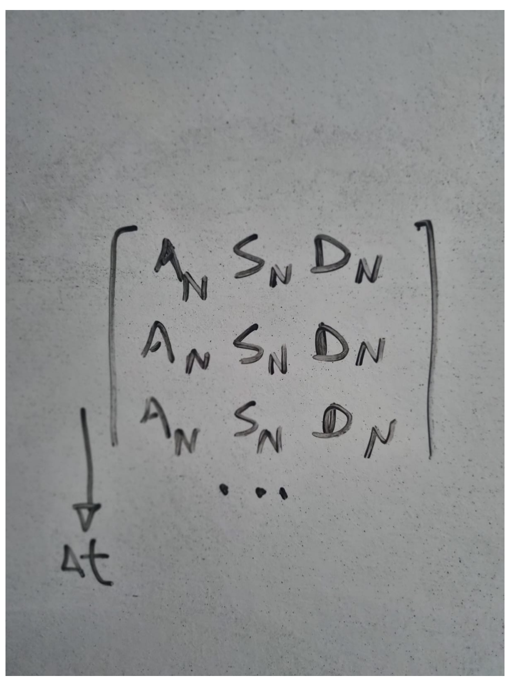

Figure 2: Event evolution by time (T).

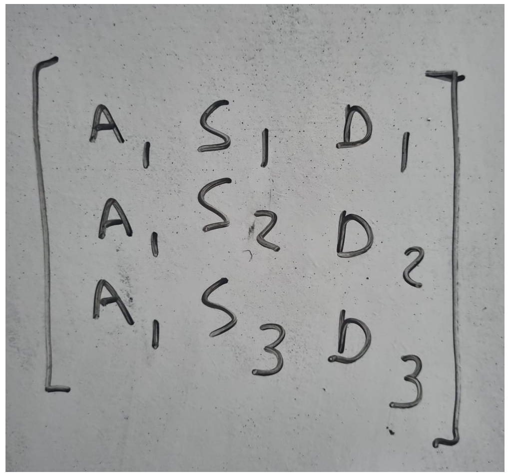

Figure 3: Event evolution by time (T) but in low entropy.

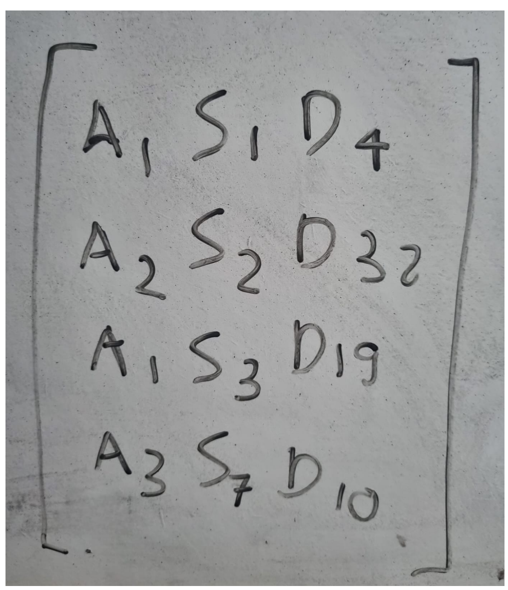

Figure 4: Event evolution by time (T) but with high entropy.

the cognitive principle of figure-ground distinction, enabling users to separate interaction elements from informational outputs.

Titles and resource labels must be unambiguous, concise, and non-repetitive. Logical coherence among filters is essential—contradictions or overlaps can distort analyses and mislead decision-making. Each filter should operate within a harmonized taxonomy, ensuring that the data is viewed through consistent conceptual lenses.

4 Temporal Representation and Granular Analysis

At the heart of every chart or flow diagram lies a temporal hypothesis: events unfold in time. Given a dataset, each action A—executed by an operator O (human or automated)—is timestamped relative to an origin event or the viewer's current point in time.

An action may represent a sale, registration, event, service instance, purchase, etc. The granularity of analysis may depend on:

- The agent performing the action
- The attributes of the action (object, color, shape, weight, value, logical-mathematical result, etc.)

Each attribute S can branch into further sub-attributes, forming a tree rooted in the original event A, but all branches remain subject to the axis of time.

The arrangement of events may follow different temporal orders:

- **Low entropy (ordered):** events follow a clear ascending or descending pattern
- **High entropy (chaotic):** temporal sequences are undefined or duplicated under varying conditions

To manage chaotic data effectively, each event must receive a unique identifier ID_A. The frequency of each event $f(ID_A)$ can be tracked over time. Furthermore, we may define groups of attributes $\{S_1, S_2, \ldots, S_n\}$ that also receive unique identifiers ID_G and are clustered according to filter-defined characteristics.

Mathematically, we define the filtered event occurrence set as:

$$F(E) = \sum_{i=1}^{n} f(ID_{A_i}, ID_{G_j}, t) \cdot \delta(F_k) \tag{1}$$

where f is the frequency function, t is the time index, and $\delta(F_k)$ is an indicator function that activates when a filter F_k is applied.

5 Conclusion

Organizing data within BI tools is not merely a technical task but an epistemological endeavor. By grounding visualizations in secure, noise-free data, clearly separating filter mechanisms, and aligning event tracking with temporal logic, we foster clarity and actionable insight. The BI interface becomes a stage where reason and data meet—a canvas of cognition.

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